

# Land Product Validation (LPV) Sub-group Meeting



Fernando Camacho – (EOLab/U. Valencia) – Chair

Vice Chair – Michael Cosh (USDA)

Subgroup meeting

7 July 2020

**NEXT LPV TELECON 01 Sep 2020**

# Attendance

## Participants

Fernando Camacho  
Michael Cosh  
Jaime Nickeson  
Zhuosen Wang  
Frank Göttsche  
Laura Duncanson  
Gareth Roberts  
Joshua Gray  
John Bolten  
Victor Rodríguez-Galiano  
Dominique Carrer  
Sylvain Leblanc  
Carsten Montzka

Tomoaki Miura  
Else Swinnen  
Hongliang Fang

## Not attending

Thomas Nagler  
Marie Weiss  
John Armston  
Glynn Hulley  
Mat Disney  
Louis Giglio  
Pontus Olofsson  
Sophie Bontemps  
Chris Crawford

# Proposed agenda items

- Welcome
- Status of Working Group
- WGCV-46 Virtual Plenary Report
- Validation Stage Hierarchy Update
- How to improve our communication with stakeholders?
- Focus Area review and update status
- Focus Area Reporting

# Status of Working Group

Still more changes to report!! 😊

We wish to thank Andrew Edwards for serving as the one of the Fire focus area co-leads for his term. We didn't get to hear from him much, as our telecon time is not so easy for our friends down under.

And, after serving WAY more than his share of years with LPV, and continuing as ex-officio status for many more, Luigi Boschetti has hung up his LPV hat and handed it to Louis Giglio, of the University of Maryland, so we will maintain full representation for the Fire focus area.

Louis has been producing fire and burned area products from MODIS and VIIRS for several years, and has been a member of the LPV fire community for just as long.

**Welcome Louis!**

# WGCV Virtual Plenary Report

- Short meeting (11 and 15 May) to report progress on CV actions
- Philippe Goryl (ESA) candidate for the next Vice Chair, made a presentation on his career and his view on the WGCV.
  - Vote was two weeks after the meeting by email, results will be presented in WGCV-47.

Related to LPV :

- Status of CARD4L Review (Medhavy Thanpakkan)
  - USGS submitted Landsat Surface Reflectance and Surface Temperature products
  - ESA submitted Sentinel-2 Surface Reflectance
  - Data and documents under evaluation by the Review Panel
- CEOS SRIX and BRIX-2 plans were presented by F. Camacho and P. Goryl.
- Progress on Cloud Masking inter-comparison (CMIX) (P. Goryl)
  - 10 products/algorithms intercompared on S2 data, 7 validation datasets
  - All results show accuracies >80%, indicating good cloud screening but could be improved. There is **no clear best algorithm**, with each having merits.
  - Need to better define transparent cloud and boundary of clouds.
  - Current validation datasets and validation methodology is insufficient → **CMIX II recommended**
- **WGCV-47 virtual (next week)– 13th -17th July 2020**

# LPV WP - Validation Stage table update

Action 19-LPV-01 closed. Please use this agreed upon version for your protocol and validation documents

Validation Stage - Definition and Current State		Variable
0	No validation. Product accuracy has not been assessed. Product considered beta.	
1	Product accuracy is assessed from a small (typically < 30) set of locations and time periods by comparison with in-situ or other suitable reference data.	<b>Snow Fire Radiative Power</b>
2	Product accuracy is estimated over a significant (typically > 30) set of locations and time periods by comparison with reference in situ or other suitable reference data. Spatial and temporal consistency of the product, and its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	<b>fAPAR Phenology Burned Area Land Cover LAI</b>
3	Uncertainties in the product and its associated structure are well quantified over a significant (typically > 30) set of locations and time periods representing global conditions by comparison with reference in situ or other suitable reference data. Validation procedures follow community-agreed-upon good practices. Spatial and temporal consistency of the product, and its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	<b>Vegetation Indices Albedo Soil Moisture LST &amp; Emissivity Active Fire</b>
4	Validation results for stage 3 are systematically updated when new product versions are released or as the interannual time series expands. When appropriate for the product, uncertainties in the product are quantified using fiducial reference measurements over a global network of sites and time periods (if available).	

# Improve communication with Stakeholders

- How might we improve communication with stakeholders? This question was posed during our last telecon...
- Besides the WGCV and LPV Plenaries and the annual newsletter, which is a high-level overview, we do not communicate regularly with stakeholders. With the requests this year from ESA to attend our telecon meetings we felt that we could instead offer to post our telecon minutes to share our regular communications.
- There were no responses to this question posed with the last distribution of minutes, so we will post these, beginning with 2019, to a new section on the web site.

# Focus Area Review/Update Status

Status of updates by focus area.

Some only need a review, changes are not required, just assure all is current!

Action needed!!

Focus Area	Letter sent to leads	Home Page Review / Update	Products Reviewed/ Updated	Collaboration Review/ Update	References Updated	Listserv review/ update	Letters to community
<b>Landcover</b>	Apr 2019					Oct 2019	
<b>Biophysical LAI/Fapar</b>	Apr 2019	July 2019	July 2019	July 2019	July 2019	Oct 2019	Sep 2019
<b>Surface Rad/Albedo</b>	Apr 2019	Dec 2019	Oct 2019	Dec 2019	Dec 2019	Dec 2019	Draft Ready
<b>LST/Emissivity</b>	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	
<b>Fire/Burn</b>	Apr 2019		Mar 2020		Mar 2020		
<b>Soil Moisture</b>	Apr 2019		Feb 2019		Sep 2019	Sep 2019	
<b>Phenology</b>	Apr 2019				Apr 2020		
<b>Snow Cover</b>	Apr 2019					Oct 2019	
<b>Vegetation Index</b>	Apr 2019	Sep 2019	May 2019	Sep 2019	May 2019	May 2019	
<b>Biomass</b>	Apr 2019	Apr 2019	Mar 2020	Apr 2019	Apr 2019	Oct 2019	

# Focus Area Reports

- LST&E
- Surface radiation
- Soil Moisture
- Vegetation Indices
- Snow
- Biomass
- Land Cover
- Biophysical (LAI/FAPAR)
- Fire/Burn Area
- Phenology

# LST & Emissivity (1/2)

## COVID-19 and conferences

- LST CCI User Workshop (24-26 Jun 2020; **zoom & padlet**):  
100+ registrations, about 50 people attending each session  
Presentations available at **<https://padlet.com/infolstcci>**
- AGU Fall meeting, **7-11 Dec 2020: Format TBD**
  - **Temperature Session: Taking the Temperature of the Earth**
- 6th Sentinel-3 Val Team meeting: **moved to 14-17 Dec 2020**
- EUMETSAT Conference 2020: **cancelled**  
(next: Bucharest, 20-24 Sep 2021)

# LST & Emissivity (2/2)

## Landsat LST algorithm (1982-now)

- Ermida et al. (2020), Google Earth Engine Open-Source Code for Land Surface Temperature Estimation from the Landsat Series. *Remote Sensing*, doi: 10.3390/rs12091471
- Based on the ‘Statistical Mono Window’ (SMW) algorithm for METEOSAT series; bare soil emissivity from ASTER GEDv3 (Duguay-Tetzlaff et al. (2015), *Remote Sensing*, doi: 10.3390/rs71013139)

Production chain in JavaScript code at GEE or Git repositories:

- [https://code.earthengine.google.com/?accept\\_repo=users/sofiaermida/landsat\\_smw\\_lst](https://code.earthengine.google.com/?accept_repo=users/sofiaermida/landsat_smw_lst)
- [https://earthengine.google.com/users/sofiaermida/landsat\\_smw\\_lst](https://earthengine.google.com/users/sofiaermida/landsat_smw_lst)

Validation over twelve sites (SURFRAD, BSRN, KIT)

- Robust bias (RMSE): 0.5 K (2.0 K), -0.1 K (2.1 K), 0.2 K (2.1 K) for Landsat 5, 7 and 8, respectively.

# Surface Radiation

Newsletter has been sent to the community.

Downward radiance validation best practices protocol

- Working on the outline

Upcoming meetings

- IGARSS, Sep 26-Oct 2, 2020. virtual symposium
- AGU fall meeting, Dec 7-11, 2020, virtual meeting

Projects

- Preparation proposition CDOP4 with EUMETSAT (2022-2027). 3 new missions (EPS-SG/VII & 3MI; MTG/FCI).

Articles

- Lellouch, Carrer et al., *Evaluation of two Global Land Surface Albedo Datasets Distributed by the Copernicus Climate Change Service and the EUMETSAT LSA-SAF*. *Remote Sensing*, 2020, 12(11), 1888;  
<https://doi.org/10.3390/rs12111888>  
 -> Performance of ETAL albedo (EUMETSAT) equivalent to MODIS. Lower performance for C3S V1 albedo (COPERNICUS).

# Soil Moisture

## News:

- Best Practices Protocol: Submitted to LPV, now implementing feedback from Fernando
- QA4SM - new domain: qa4sm.eu, added new DOI feature
- Validation good practice paper online: Gruber, A., G. De Lannoy, C. Albergel, A. Al-Yaari, L. Brocca, J.-C. Calvet, A. Colliander, M. Cosh, W. Crow, W. Dorigo, C. Draper, M. Hirschi, Y. Kerr, A. Konings, W. Lahoz, K. McColl, C. Montzka, J. Muñoz-Sabater, J. Peng, R. Reichle, P. Richaume, C. Rüdiger, T. Scanlon, R. van der Schalie, and W. Wagner (2020): *Validation practices for satellite soil moisture retrievals: What are (the) errors?* Remote Sensing of Environment 244, 111806. [DOI:10.1016/j.rse.2020.111806](https://doi.org/10.1016/j.rse.2020.111806)

## Workshops:

- National Soil Moisture Workshop (U.S.) August 12-13, 2020, Beltsville, MD. Virtual Meeting!
- 6th Satellite Soil Moisture Validation & Application Workshop, postponed to autumn 2021, Perugia, Italy
- SMOS for Climate symposium, postponed to 9-11th March 2021 at the Eden project, UK
- 7th Satellite Soil Moisture Validation and Application Workshop, Fall 2022, New Orleans, USA

# Vegetation Indices

- Inter-comparison and spectral harmonization of NDVI of various sensors (Sentinel-2A & B, Landsat 8, Deimos and Proba-V 100m)
- Evaluation of the S3-based BRDF-normalized NDVI (Copernicus Global Land Service (CGLS))
- It was finally decided to release the CGLS NDVI 1km V3, which is a BRDF-normalized and spectrally harmonized time series from SPOT-VGT and PROBA-V at 1km resolution. A publication of its validation is in preparation.
- Publication: Miura, T., & Nagai, S. (2020). Landslide detection with Himawari-8 geostationary satellite data: A case study of a torrential rain event in Kyushu, Japan. Remote Sensing, 12(11), 1734. doi:10.3390/rs12111734 (A Special Issue: [Earth Monitoring from A New Generation of Geostationary Satellites](#))

# Snow

## Update on Snow Products:

- ESA SNOW-CCI: next Snow Cover products (FSC, SWE), daily 40/20 years time series planned for Oct 2020
- Second Satellite Snow Product Validation and Intercomparison Exercise (SNOWPEX): Kickoff by September 2020; ISSPI-WS planned for Q2/Q3 2021 (TBD; COVID status)
- EEA High Resolution Snow Extent Product from Sentinel-2 (20m, near real time; Europe; planned for May 2020); released by Mid July 2020; User Consultation WS (via WEBEX), 15-16 October 2020 (TBC)

## Recent Publications:

- Pulliainen, J., Luojus, K., Derksen, C., Mudryk, L., Lemmetyinen, J., Salminen, M., Ikonen, J., Takala, M., Cohen, J., Smolander, T., and Norberg, J.: Patterns and trends of Northern Hemisphere snow mass from 1980 to 2018. *Nature*, 581, 294-298, 2020, <https://doi.org/10.1038/s41586-020-2258-0>

## Upcoming relevant WS:

EC ESA EO for Polar Science Workshop, 28 – 30 October 2020 Copenhagen  
EEA HR Snow Services: User Consultation WS (15-16 Oct. 2020 TBC)

# Above Ground Biomass

- Biomass protocol now in final editing stages before we circulate for review & wider comment. On track to have it published late summer / early fall.
- Also working on a 'business case' for presentation to the SIT in October on implementation of the biomass protocol through new coordinated field measurements funded by CEOS member agencies. Going a bit slow, but getting there.
- GEDI mission still going well, hoping to extend life on the ISS until 2023 (2 more years!).
- Coordinated cal/val between GEDI, ICESat-2, NISAR, ESA BIOMASS and JAXA missions ongoing
- BRIX2 exercise (biomass algorithm inter comparison) scheduled for January in Toulouse, France, in coordination with the ESA BIOMASS, CCI BIOMASS, and POLINSAR meetings. Announcement for applications forthcoming early fall
- New(ish) AFOLU roadmap in development, generally following model taken by David Crisp for Greenhouse Gases. Focus on activities / recommendations toward the 2023 Global Stocktake. Scope not yet crisp, but appears to be focusing on a CEOS push for policy relevant of remote sensing products (e.g. biomass, which seems to be the key product in the AFOLU efforts).
- Forthcoming white paper on relevance of biomass products for policy, led by Shaun Quegan at request of the UK Space Agency. Heavily linked to CEOS biomass protocol, expanding our section on policy relevance.

# Land Cover

*Example fluxmetric extra*

# Biophysical

- References
  - Brown et al., L.A., Meier, C., Morris, H., Pastor-Guzman, J., Bai, G., Lerebourg, C., Gobron, N., Lanconelli, C., Clerici, M., & Dash, J. (2020). Evaluation of global leaf area index and fraction of absorbed photosynthetically active radiation products over North America using Copernicus Ground Based Observations for Validation data. *Remote Sensing of Environment*, 247, 111935.  
<https://doi.org/10.1016/j.rse.2020.111935>
- Meetings
  - IGARSS'20, Virtual Symposium Sep 26-Oct 2, 2020 (Video due on Jul 10).
  - ISPRS, Nice, France, Jul 4-10, 2021
  - RAQRS 6<sup>th</sup>, Univ. of Valencia, Spain. Sep 20-24, 2021.
- Field campaigns in coming months
  - Vertical distribution of forest LAI/FAPAR for LiDAR validation (H. Fang)
  - P2S2 – forest validation project, delayed due to COVID-19. May start in August.
- *Remote Sensing* special issue
  - “Remote Sensing of Biophysical Parameters” (deadline: Nov 27, 2020)  
Editors: J. GarcíaHaro (U. Valencia), H. Fang (CAS), and M. Campos-Taberner (U. Valencia)  
[http://www.mdpi.com/journal/remotesensing/special\\_issues/Biophysical\\_Parameters](http://www.mdpi.com/journal/remotesensing/special_issues/Biophysical_Parameters)
  - “Recent Advances in Satellite Derived Global Land Product Validation” (Dec 31, 2020)  
Editors: F. Camacho (U. Valencia) and J. Dash (U. Southampton)  
[https://www.mdpi.com/journal/remotesensing/special\\_issues/global\\_land\\_product\\_val](https://www.mdpi.com/journal/remotesensing/special_issues/global_land_product_val)

# Fire/Burned Area (1/2)

Welcome to Louis Giglio and many **thank you** to Andrew Edward and Luigi Boschetti for your service to LPV Fire.

Updates to the home page :

- Burned area\FRP validation references and products list upto date
- Listserv being updated

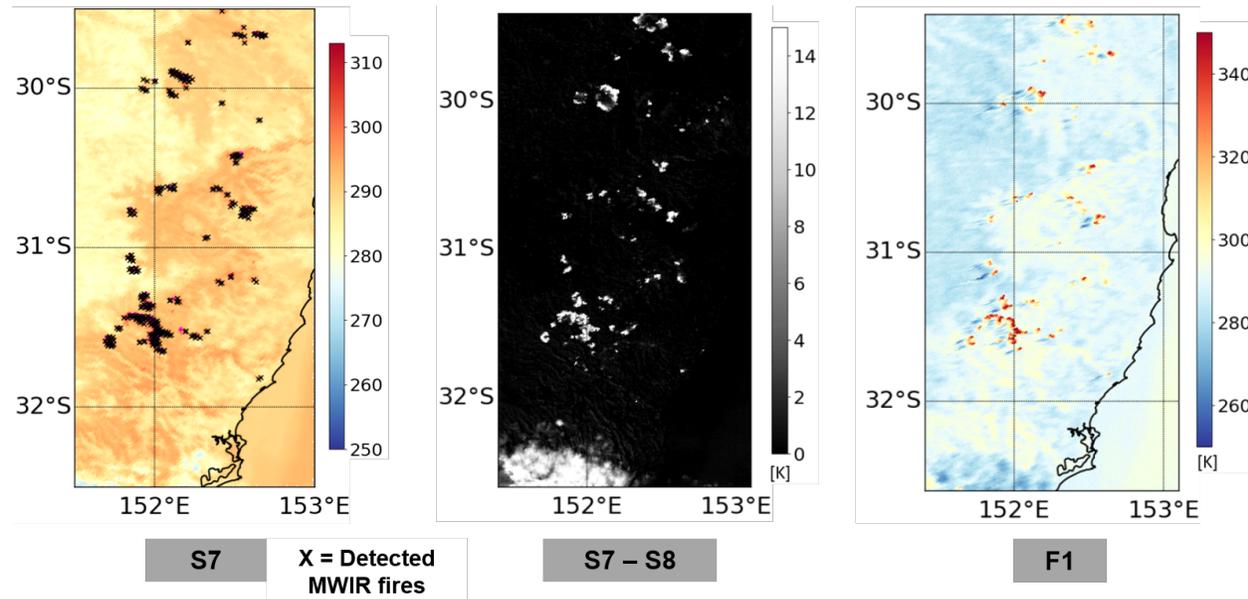
New burned area reference dataset being made available :

- Database developed using Landsat and Sentinel-2 imagery
  - 2769 reference burned area files
  - Globally distributed
  - Burned areas have been visually assessed
  
- Franquesa, M., Vanderhoof, M.K., Libonati, R., Rodrigues, J.A., Setzer, A.W., Stavrakoudis, D., Gitas, I.Z., Roteta, E., Padilla, M. and Chuvieco, E., 2020. Development of a standard database of reference sites for validating global burned area products. *Earth System Science Data Discussions*, pp.1-20.
  
- <https://doi.org/10.21950/BBQQU7> (not active yet - paper in discussions)

# Fire/Burned Area (2/2)

Sentinel-3 NRT FRP product released (20<sup>th</sup> April 2020)

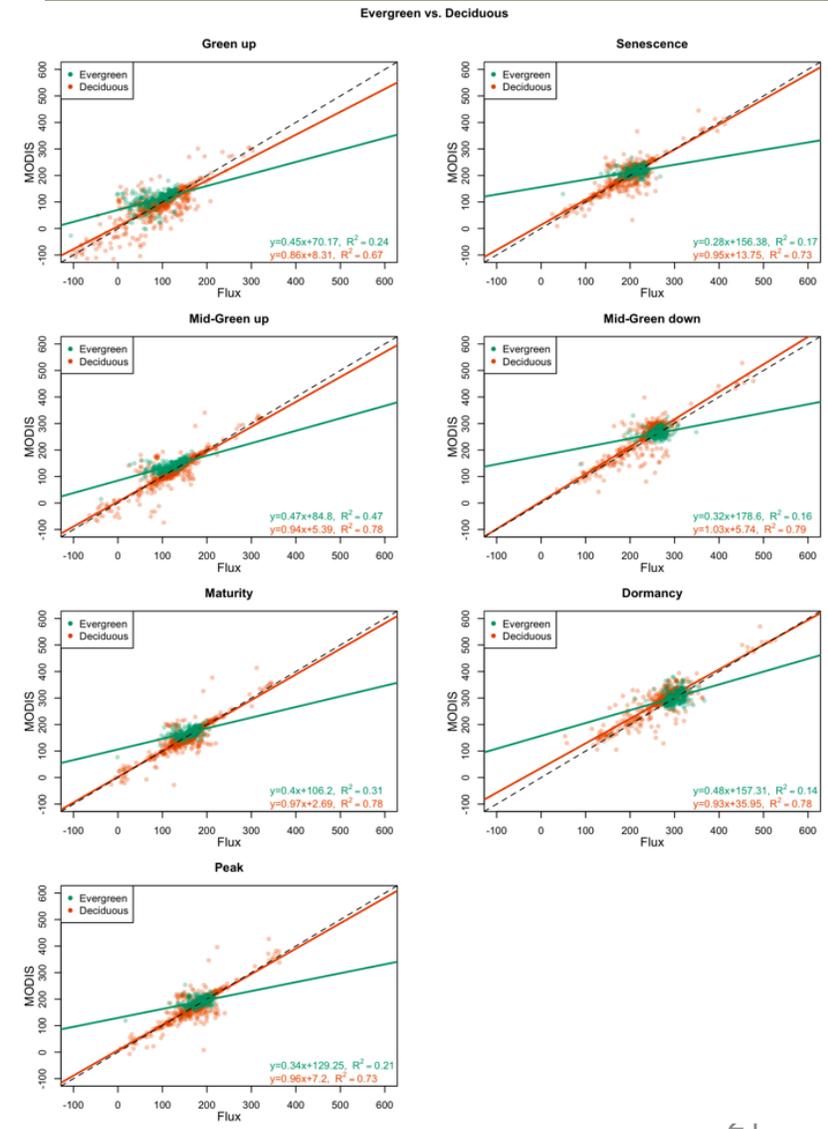
- FRP retrievals from S3-A and S3-B (10:00 and 22:00 )
- 1km product
  - Current version mainly applicable to night-time granules
- Product under evaluation
  - Preliminary results available :
  - <https://www.eumetsat.int/website/home/Data/ScienceActivities/OperationalAlgorithms/CopernicusSentinel3NRTFireRadiativePowerFRP/index.html#OVP>
- Available via EUMETCAST, EUMETSAT data centre and Copernicus Online Data Access



# Land Surface Phenology

- CEOS LPV website updates: LSP products table updated and refined
- GPP seasonality from FLUXNET2015
  - New independent dataset
  - MCD12Q2 comparison: Use minimally adapted C6 algorithm to retrieve GPP *fluxmetrics*
  - Good agreement between flux and phenometrics; varies by SFT (evergreen vs deciduous)
  - Yu & Noormets (Ecological Indicators) recently published similar dataset; relationships w/ MCD12Q2 C6 appear robust
- USNPN~MCD12Q2 comparison completed

## MCD12Q2 C6 ~ FLUXNET fluxmetrics



## Example fluxmetric extraction

